Amateur Beekeeping

By E. R. ROOT

The A. I. Root Company
Medina, Ohio
1917

Carlton Jewett

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There are three classes of individuals in each colony—namely, the queen bee or true female, the drones, and the worker, or neuter bees as some call them, but more correctly undeveloped females. Each worker-bee is functionally the same as a queen-bee except that her tongue, mouth parts,

Queen. Drone. Worker.

pollen-gathering bristles on the legs, and the sting are more fully developed than the same organs in the only true female, known as the "queen."

A colony of bees may contain anywhere from 25,000 to 75,000 individuals, and in rare cases as high as 100,000, all the daughters of one queen-bee. But the average good colony for producing honey will run anywhere from 35,000 to 50,000 workers. Dur-

ing the winter this number will be reduced, possibly a half; for Nature apparently goes on the assumption that it is wise not to produce a lot of unnecessary consumers for winter.

The duties of the worker-bees are quite varied. Primarily their business is to gather nectar or honey; but in reality bees gather nectar, and by some mechanical process which no one seems to understand fully, change the nectar or sucrose into invert sugar or honey. As a matter of fact, they gather nectar and make it over into honey; hence it comes about that bees actually "make honey."

Bees also gather pollen from the flowers, and store it in combs the same as they store honey. The pollen is used for making a milky-white nitrogenous food into which enters honey to feed the larvæ. This food is very much like thin condensed milk. As the larvæ develop this same food or "pap" is made richer and stronger.

Bees also gather a kind of glue for making up what we call bee-glue, or propolis. This is used to seal up all cracks that might let cold air into the hive. The word "propolis" is derived from two Greek words—*pro*, meaning in front, and *polis*, a city. In ancient times, especially with some strains of *Apis mellifica*, the bees used this substance in front of the hive to contract the entrance in order to keep out rodents and

other insects, hence the name—in front of the city—or propolis.

Worker-bees naturally fall into two divisions—young bees for taking care of young brood, building comb, protecting the entrance against robbers, and in other ways performing the inside work of the hive. The older bees, or "fielders," are those that gather the nectar, pollen, and bee-glue. When there are few or no young bees the older ones can and do assume the duties of nurse bees.

The fully developed, or true female, is called the "queen." As already stated, she functionally is much the same as the workers with this difference: Her mouth parts, pollen-gathering apparatus, as well as her sting, are atrophied or aborted, while her ovaries are highly developed. She is capable of laying as many as 5000 eggs in a day, but usually 3000 is the limit. During the height of the season she will not average, probably, over 500 eggs a day. At the close of the active season she lets up on her egg-laying, sometimes stopping altogether. This seems to be wise provision in nature to prevent the rearing of a lot of useless consumers that would simply use up all the stores before winter comes on. Along in the fall, if there should be a fall flow, egg-laying will start up again, and a lot of fresh bees will be reared to make up a colony that will go into winter quarters. The bees

that gather the crop during an active honey season very seldom if ever live to go into winter quarters. The fruit of their toil goes to their successors.

Only one queen-bee, under normal conditions, is allowed in the hive at a time. The worker bees, apparently, are willing to tolerate one or more queens; but evidently the queens themselves are jealous of each other, and, when they meet, a mortal combat follows, during which one of them receives a fatal sting. The reigning queen-bee, therefore, is often survival of the fittest. Sometimes mother and daughter will get along very nicely together, but along toward fall the mother disappears. Whether the daughter helps to make away with her, whether she dies of old age, or whether the bees take a hand in the matter, we do not positively know.

Two strange queens cannot, as a rule, be let loose in the same hive. The moment they meet they clinch each other in mortal combat, and the one that is successful enough to sting her antagonist comes out the victor. As soon as the vanquished receives her wound she quivers a moment and dies. This is about the only time a queen uses her sting, for she rarely stings a human being, although she may at times sting a worker.

The average queen-bee will remain the mother of a colony for from two to three

years. She may live to be as old as five or six years, but these cases are very rare. Usually a queen over two years old is not worth much, and some believe that anything over a year should be replaced by younger blood.

The other individuals in the hive are male bees or drones. Their mouth parts and pollen-gathering apparatus are all very much aborted, and they have no sting. They are very much at the mercy of their sisters, and their only function is to fecundate the queen-bee. This act takes place in the air, for apparently Nature has designed to prevent in-breeding. After the main honey-flow is over, the drones are rudely pushed out at the entrance by their sisters, where they soon starve to death.

The average young queen, when she sallies forth in the air on her wedding trip, may or may not find her consort from the same hive, but the probabilities are she will find a drone from some other hive. As soon as the act of copulation has taken place her mate dies. The two whirl around in the air until they drop, when the queen tears herself loose, carrying with her the drone organs. Soon after she enters her hive these are removed by the worker bees, but the spermatic fluid is retained in the spermatheca, where a supply sufficient to last the rest of her life is held. The queen is from that time on able to lay fertilized

eggs that will produce bees, and infertile eggs that produce *only drones.*

The same egg that produces a worker-bee will also produce a queen-bee. The question of whether an egg shall be developed into a queen or an ordinary worker depends almost entirely on conditions. If the bees desire to raise a queen, or several of them, they will build one or more large cells, and feed the baby grubs a special food. In sixteen days a perfect queen will emerge; while in the case of the worker, fed on a coarser food, 21 days elapse.

Such, in brief, is a statement concerning the inmates of the hive and their duties. Before we proceed further it will be proper now to say something about the hive. In doing this we shall start with the old box hive of our forefathers, working up to the modern hive which has made it possible for us to handle bees with such infinite pleasure and profit.

THE OLD WAY OF KEEPING BEES.

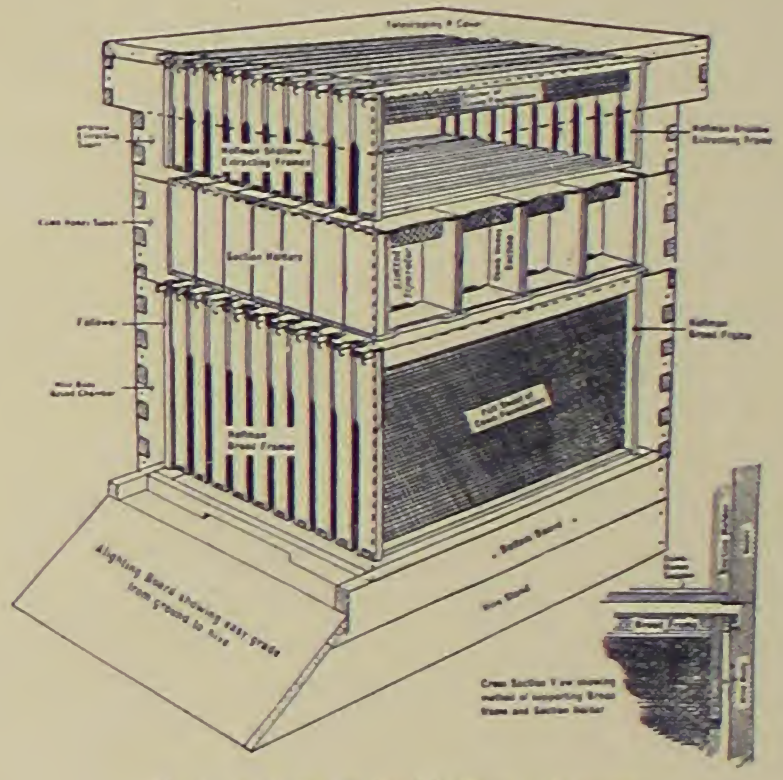
The old primitive box hives of our grandfathers, consisting of a rude box (hence the name), was about 12 inches square, and from two to three feet deep. Through the center were secured two cross-cleats at right angles to each other, to help support the combs. This box hive standing on a board or slab usually had a notch at the bottom

in front, to provide an entrance and exit for the bees. The bees, when building their combs in such a hive, fastened them to the sides and ends over and around the cross-cleats before mentioned. The combs, when so built, would, of course, permit of no examination nor handling, as do the modern hives; and when it was desired to take the honey, the bees of the heaviest hives in the fall were brimstoned, while those of the lightest were allowed to live over until the next season, to provide for swarms to replace those brimstoned. The honey taken from box hives was mixed with bee-bread and brood, and was of inferior quality. The combs were cut out of the hive and dumped into buckets to be used as necessity required.

The modern hive has long since eliminated these crude and cruel methods, and in their stead we have accessibility to every part; and, so far from destroying our little servants, we can take their honey without a sting if we follow directions. Every comb is now built in movable frames that permit of easy examination. In fact, we can open the hive and remove the frames, playing with our pets by the hour if we know how. There is no more alluring pastime for the tired business or professional man or the overworked housewife than the keeping of bees. They all say it's just fun, and it's "fun" that makes money.

THE MODERN HIVE FOR THE PRODUCTION OF COMB AND EXTRACTED HONEY.

The modern hive, or exterior housing, in its simplest form consists of a floor or bottom-board; a hive body (box without cover or bottom) to hold the brood-frames; of supers (shallow box rims) to hold section-



Modern hive with Hoffman frames.

holders for the sections or extracting-frames for extracted honey; a thin wooden lid, or "super cover," and over the whole a "telescope cover," as shown, to shield the hive from the weather. In addition there's an entrance-contracting cleat that can be

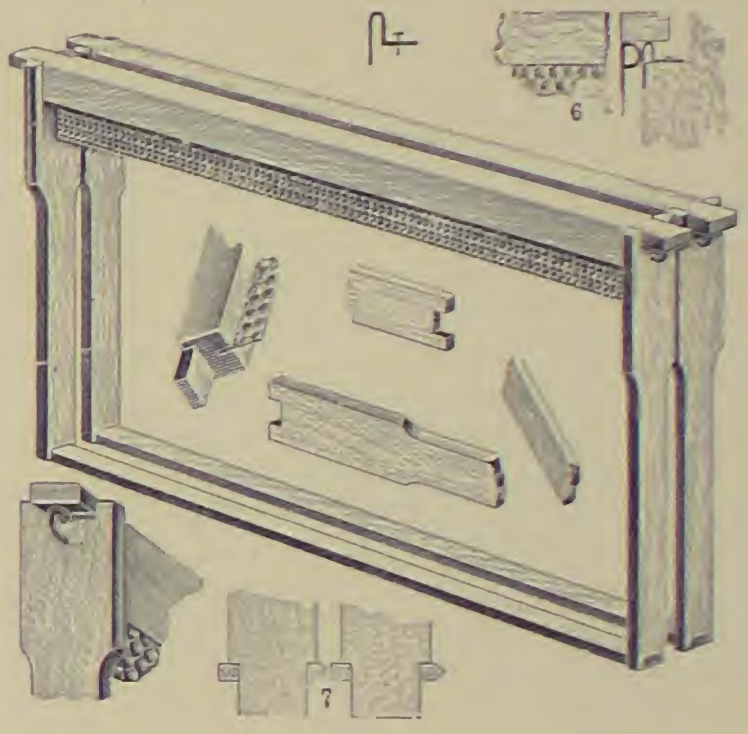
removed so that a wide or narrow entrance may be used, depending on the season. In the best-regulated apiaries, hive-stands are used for holding the hives. These protect the bottom and hive proper from unnecessary exposure to the ground and rot, and at the same time provide an easy grade or alighting-board for the convenience of heavily laden bees as they come in from the field. When a bee is filled with honey it very often drops down a foot or two from the hive. It is, therefore, very important to have an easy runway into the hive proper, and hence the hive-stand provided with an alighting-board, as shown.

Each of the hive parts here enumerated is separable. One part can be piled on top of another in such a way as to accommodate the largest colonies and the largest yields of honey that may be secured. The modern hive, therefore, is capable of all degrees of expansion, to accommodate any colony or any honey crop. Some large colonies will store enough honey to make a hive four and even five stories high.

BROOD-FRAMES

Movable frames to hold the combs are called "brood-frames." The tops of these have projections resting upon rabbets cut in the upper ends of the hive. (See diagram, lower right hand.) The end-bars of the frames have, near the top, projecting

ends just wide enough so that the combs will be spaced the correct distance apart. Such self-spacing frames for holding the combs are called "Hoffman brood-frames," and any one of them can be removed and replaced. Another set of frames of the



Hoffman frame.

same pattern, but shallower, are used for the storage of the surplus honey. These are hung in shallow hives, or "supers," as they are technically called. The honey may be cut out of them and stored in tin cans, or it may be "extracted" from the combs by means of a honey-extractor.

Every comb has a series of honey-cells on each side, which, when filled with honey,

are capped over with a thin film of wax. This capping is sliced off with a sharp-bladed knife made for the purpose, called an "uncapping-knife." The combs, with the cappings removed, are then placed in the baskets of a centrifugal honey-extractor. These baskets are geared to run at a relatively high rate of speed inside of a metal can. The honey is thrown out by centrifugal force from the side of the comb next to the

Honey-knife.

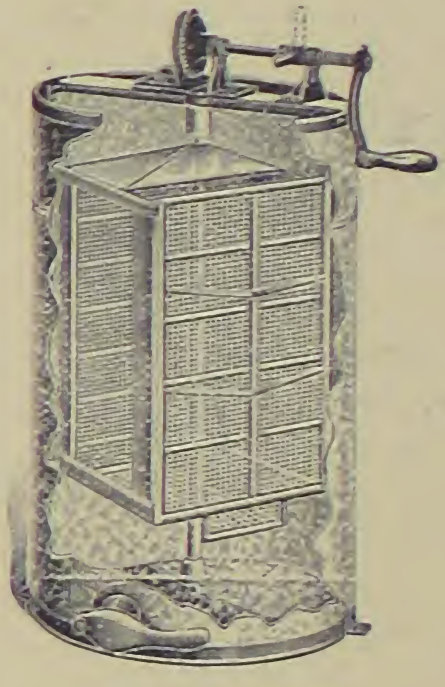
can. The machine is stopped; the combs are reversed, when the reel is started revolving, throwing the honey out from the other side also. When emptied the combs are put back into the hive and refilled with honey, when they are again extracted as before. This process may be repeated one or more times during the season, or as long as the honey-flow lasts.

Extracted honey can be produced for less money than that in the comb, because the empty combs can be used over and over again, year after year. As it takes anywhere from 5 to 10 lbs. of honey to make a pound of wax, the extracted honey, or honey separated from the comb, saves the bees making comb each time. As a matter

of fact, the market price for extracted is but a little more than half that of comb honey.

SECTIONS AND SEPARATORS AS USED IN COMB-HONEY PRODUCTION.

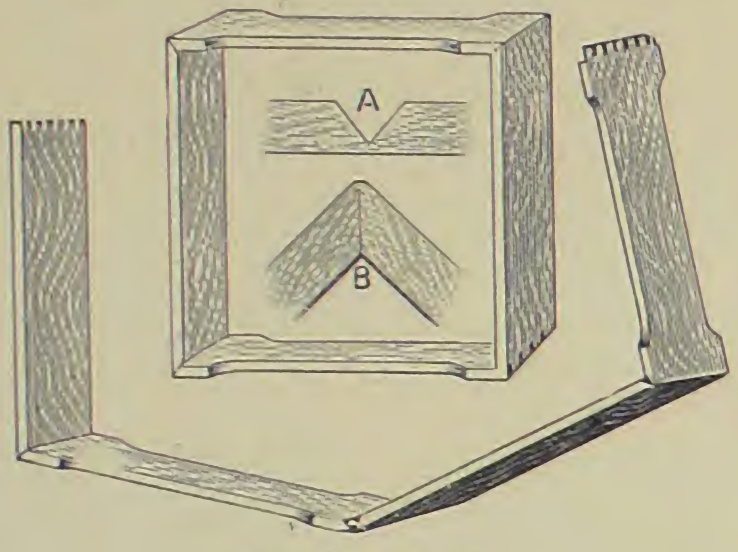
The production of honey in the comb involves a different set of fixtures. Comb honey is produced in little square boxes



Novice extractor.

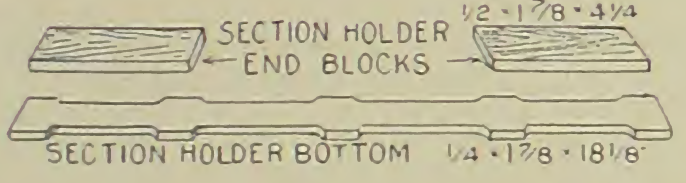
technically called "sections." These are usually either 4 x 5 x 1⅜ inches wide, or 4¼ square by 1⅞ wide. These sections, four in number, are placed in a sort of frame called a "section-holder." Between each row of sections, when placed on the hive, is a wooden separator consisting of a thin piece of veneer wood a little narrower

than the section is deep. Sometimes a series of thin slats, fastened together by cross-cleats, technically called "fences," are used in place of separators. The function



One-piece section.

of the separator or fence is to separate the rows of sections from each other. Without them the bees would build the comb in these

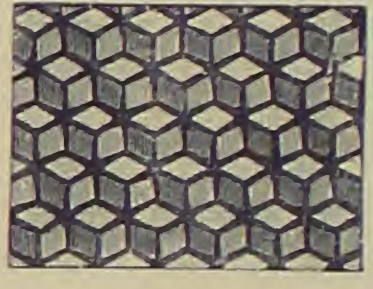


sections too fat or too lean. So far as possible it is highly important, from the marketing point of view, to have each comb in each section approximately the same weight —something between 12 and 14 ounces. While the sections will hold an even pound when filled clear full, it is very seldom that

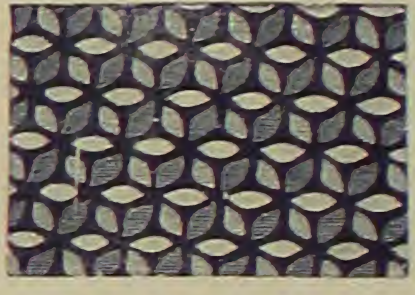
the producer of comb honey can get his bees to make his sections run uniformly one pound in weight. The average market permits and expects that comb-honey sections shall run slightly less than one pound.

COMB FOUNDATION.

In order to start the bees building their combs centrally in the section, a product known as "comb foundation" (quite generally abbreviated "fdn.") is used. This consists of a thin sheet or sheets of pure beeswax embossed or favosed, so that the



Thin.



Medium.

surface shall be an exact duplicate of the midrib or center of the honeycomb with the cells sliced off. In other words, comb foundation is a duplicate of the foundation of the natural comb, and hence the name. The artificial product has more wax in the initial cells than the natural product. This surplus is used by the bees in building out their combs. In modern apiculture it is almost an indispensable article. It is used either in narrow strips called "foundation

starters," or in full sheets. The latter are preferable, because the bees will build more nearly perfect combs—combs that are in every sense an exact duplicate of the article built wholly by the bees. Without comb foundation the bees will show a tendency to build their own product in all kinds of fantastic shapes, crosswise of the section honey-boxes or the brood-frames. Practically all the combs in modern apiculture today are built on comb foundation. This is filled with honey by the bees, and capped over, and in all respects is equal and even superior to that made by the bees without the use of starters.

TOOLS FOR HANDLING BEES.

The tools required by a beekeeper for opening his hives and doing other necessary work in the production of honey are not elaborate. The total outlay need not go above $3.00. First and foremost, there must be a bee-smoker—a device consisting of a stove and bellows for blowing smoke from some slow-burning fuel on the bees. Without smoke, many manipulations would be very difficult; and the novice, at least, would be inclined to give up the business after his first experience in trying to handle a colony of bees, especially if weather conditions were unfavorable. But with smoke, and an instrument for applying it, one can, if he knows how, perform all possible manipula-

tions with bees when weather conditions are right. In fact, a large number of bee-keepers, except during a time when weather is bad, do not use a bee-veil, gloves, nor anything else, because an intelligent use of the bee-smoker will often put the bees on their good behavior, to an extent that the use of protectors is rendered useless. Per-

Smoker.

haps a majority of honey-producers work with a veil on the hat, but not drawn down except when an angry bee seems disposed to show fight.

The other tool, if it may be so regarded, is designed for face protection. This may be in the form of a wire-cloth cylinder with suitable cape to protect the neck and shoulders, or it may be made of some sort of netting, preferably black, so as to obscure the vision as little as possible. The higher-priced veils of silk Brussels netting offer practically no obstruction to the eyes and at the same time give the wearer a sense of security that he cannot otherwise have.

Some beekeepers, wishing to get through with as large an amount of work as possible, and knowing that rapid manipulation has a tendency, in spite of smoke, to make bees sting, wear both bee-veil and gloves; and a few of the careless bunglers go so far as to wear cowhide boots in addition, tucking the trousers into the boots. We do not approve of such bungling slam-bang methods, that only irritate the bees. One will accomplish as much or more in a day, pro-

Root bee-veil.

Alexander bee-veil.

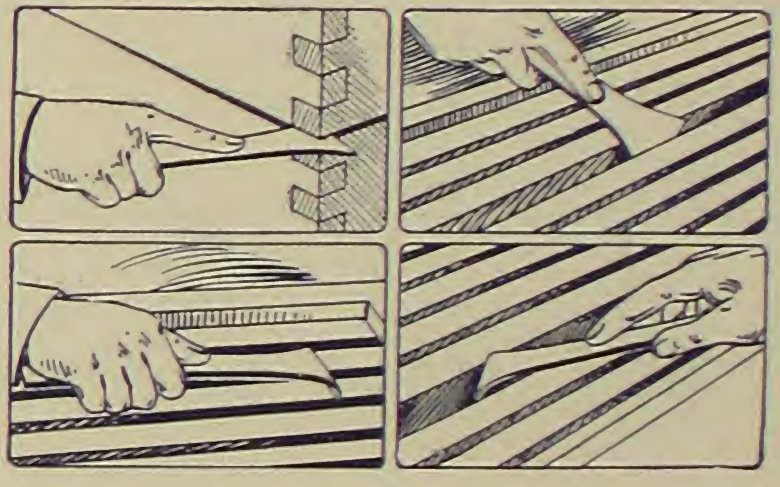
vided he works cautiously and deliberately, using his brains to save making a multiplicity of quick moves. A few slow movements carefully planned will accomplish much with bees.

Almost the only other tool required is a strong screwdriver, a knife with a good stiff blade, or, better still, a specially constructed

hive-tool made of spring steel with a broad blade for the purpose of a pry or scraper. A tool of some sort is indispensable for separating the frames and the parts of a

Hive-tool.

hive, because the bees make use of what is known as bee-glue, cementing the frames together. In warm or hot weather this bee-



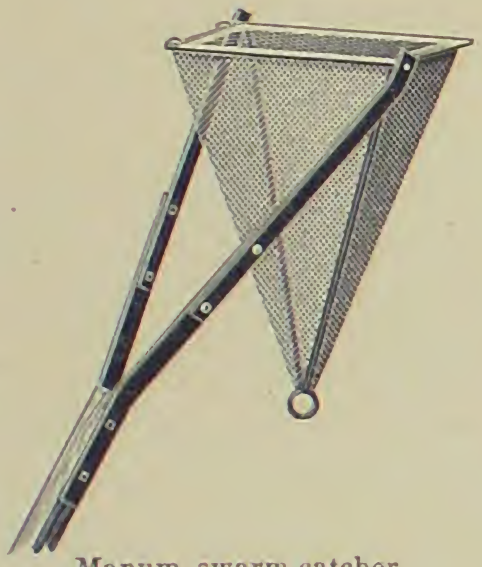
glue does not cause as much trouble in handling the hives as during cold weather, when it is stiff and hard. Ordinarily bees should not be handled at such times.

One more tool is sometimes used, and that is a swarming-box or a swarm-basket—a device invented by the late A. E. Manum. A wire basket is mounted on the end of a long pole so that a majority of the swarms can be reached and captured from the ground. Where the wings of the queen are

clipped, no such appliance is needed except in instances where a second swarm comes off with a virgin queen.

MANIPULATING A COLONY OF BEES.

Having now considered the inmates of a hive, the hive itself, and the several parts and the tools for manipulating the same, it is now in order to take up the manipulation of the hive, or the handling of a colony of bees.



Manum swarm-catcher.

The average beginner at this point may feel that he has a job on his hands. He may get stung, when his face will be disfigured so that he will not be presentable to company. While we do not deny he *may* get stung, the one who tries for the first time to handle bees should protect his hands with gloves and his face with a veil,

not because they are absolutely essential, but because it will take away that feeling of fear that might cause him to make a false move and thus incite the bees to sting.

If he will follow the directions that we are now about to give he should not receive a single sting even in his clothing. First of all, it is important that he select a warm day, between ten and three o'clock. After having lighted his smoker, he should put on his veil and gloves and approach his hive. He should be sure that the smoker delivers a blue smoke. The best fuel we have found is old rags or greasy waste, which can be had for the asking at almost any machine shop. The smoke of this is not pungent, but is a bluish white and quite opaque. Care should be taken not to work the smoker bellows too hard, as otherwise the fuel will burst into flame.

With the smoker just right, blow three or four puffs of smoke into the entrance, and in doing it be careful not to blow in too much smoke, otherwise you will start the bees in the hive on a stampede, especially if they are blacks or hybrids. While bees will not sting in this condition it renders subsequent manipulation exceedingly difficult.

The next movement is to take the screw-driver or hive tool and pry the cover up about a sixteenth of an inch—not wider, because the bees would escape. Through

the gap so made between the cover and hive itself blow in a couple of puffs of smoke. Next gently lift up the cover, following the movement with perhaps two or three light puffs of smoke. It is just as important not to use too much smoke as not enough.

One may now proceed to lift out individual frames. If they are stuck together on account of the bee-glue a little smoke may be required to follow each operation in separating the frames; but usually the smoker can be set down alongside the hive, and frame after frame be lifted out without receiving a single sting.

Care should be taken not to pinch any bees. Always place the fingers at some point where there are no bees. If they are very numerous gently brush them over to one side by pushing the fingers down between them, being careful not to pinch them in doing it.

After one has opened a hive a few times he will be able to discard the gloves, and later he can dispense with the veil at times, because he will find that an intelligent use of the smoker will do more to eliminate stings than any other one thing. After one has acquired a sense of freedom and knows the bees will not sting, he can work over them for hours at a time, getting more real joy out of his pets than from anything else on the place.

Price List

of

Bees and Queens

and other Necessary Supplies
for the Amateur Beekeeper

Sold by

The A. I. Root Co.

Medina, Ohio

BEES AND QUEENS

Our business in furnishing bees and queens in the last year or so has grown so enormously that we have been compelled to keep on hand from 800 to 1000 colonies. We employ the most experienced queen-breeders and honey-producers that are obtainable.

HOME-BRED ITALIAN QUEENS.—Safe arrival guaranteed.

	April, May	June	July, Aug., Sept., Oct.
Untested	$2.00	$1.50	$1.00
Select Untested	2.50	1.75	1.25
Tested	3.00	2.50	2.00
Select Tested	4.00	3.50	3.00

SOUTHERN-BRED ITALIAN QUEENS

For those who desire to get pure Italian stock at a moderate price, we are prepared to furnish queens direct from our breeders in the South at the following prices:

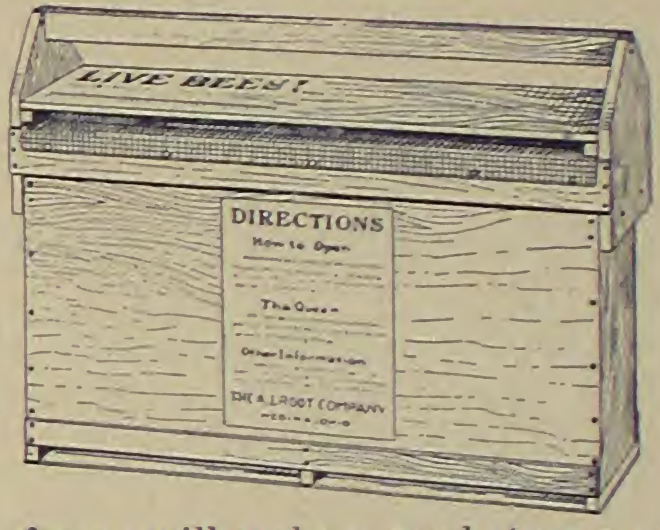
	Oct. to June
Untested queens	$1.00
Select untested queens	1.25
Tested queens	2.00
Select tested queens	3.00

OUR GUARANTEE

We stand by our guarantee. If the bees or queens do not come up to our standard we replace, free of charge. We also guarantee safe arrival and in good condition. Our long list of satisfied customers, with our constantly increasing trade in bees and queens, shows that the public is willing to pay our higher prices in order to get our stock, and because there is a real guarantee back of them.

NUCLEI AND FULL COLONIES

We can furnish one, two, three, and five frame nuclei and full colonies of bees in eight and ten frame Standard hives. The nuclei are put up in light shipping-boxes made of basswood, the sides of which are only 3-16 inch thick, and the end ½ inch. The top and bottom are covered with wire cloth. This makes a very light package, affords plenty of ventilation, and is strong enough to stand shipping from 500 to 1000 miles. The bees so put up almost invariably go through in good order with little or no loss.



A one-frame will make a good strong colony by fall if properly handled. The two, three and five-frame nuclei can be increased pro ratio, so that the investment is not so great after all; and instead of having any black bees one will have in the beginning pure Italians of the choicest stock throughout his little apiary.

	Oct. to July	July to Oct.
One-frame nucleus without queen.....	$3.00	$2.00
Two-frame nucleus without queen	4.50	3.00
Three-frame nucleus without queen....	5.50	3.50
Five-frame nucleus without queen	6.50	4.50
Colonies in eight-frame Dovetailed hive, no queen	11.00	9.50
Colonies in ten-frame Dovetailed hive, no queen	12.50	10.50

We can supply with the nuclei any of the queens mentioned in list. When one buys an extra-select queen or any high-priced queen, he would do well to have her come in a nucleus. This will assure safe arrival.

BEES BY THE HALF-POUND, POUND, TWO POUNDS, AND THREE POUNDS

A pound of bees, or even half a pound, in June, providing one has a hive with combs all ready, will make a very nice little start. A pound of bees, even in July, if the directions we send out are carefully followed, will result in one or more colonies before fall. The average beginner, however, would not be able to make such a rapid increase; but if he starts with a two to three pound package his increase will be relatively much more rapid. His first cost will be low, and there will be no danger from disease. Full particulars on how to make a start with a pound package of bees is fully explained in a booklet that will be sent for the asking.

TABLE OF PRICES OF BEES BY THE POUND, F. O. B. MEDINA, OHIO

½-lb. package of bees	June,	$2.00
1-lb. package of bees	June,	3.00
2-lb. package of bees	June,	5.00
3-lb. package of bees	June,	6.00
½-lb. package of bees	July to September,	$1.25
1-lb. package of bees	July to September,	2.00
2-lb. package of bees	July to September,	3.25
3-lb. package of bees	July to September,	4.00

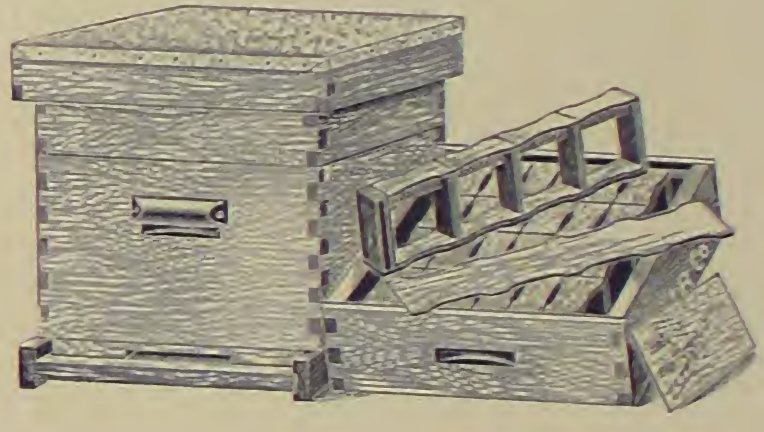
NOTE.—No queen is supplied at these prices. Make selection and add her price to the above prices.

Bees cannot be sent through the mail.

CAUTION—Don't order bees in pound packages unless you have hives filled up with frames of foundation, or, better, drawn comb.

DOVETAILED HIVE FOR COMB HONEY, 1½ AND 2 STORY.

It consists of a bottom-board, a cover, a body, or brood-chamber with Hoffman frames either empty, or with inch foundation starters, or with full sheets foundation, a 4¾-inch super with slotted section-holders, slotted separators, follower, springs, or with 4¼x4¼x1⅛-inch beeway sections and inch foundation starters, or with full sheets of foundation. When two supers are included with each hive it is then a two-story hive for comb honey.

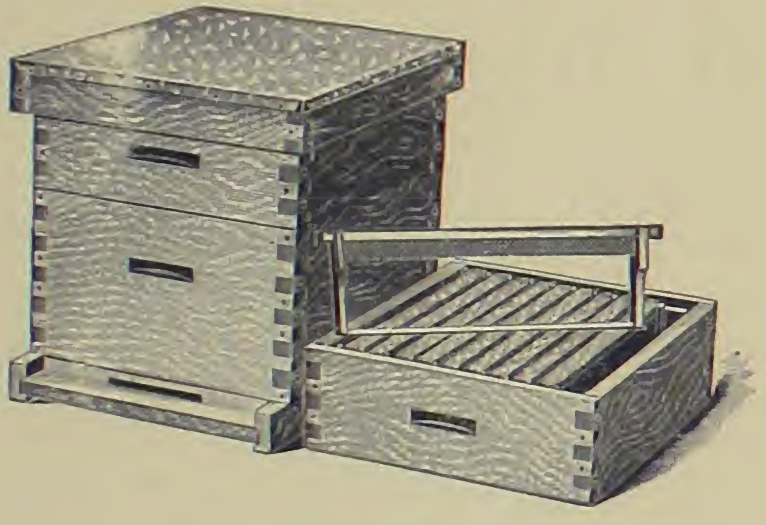


Price List of 1½-story Hive for Comb Honey in 4¼x4¼x1⅞ Slotted Sections.

	1 NP	1 KD	5 KD
8-fr. Hive with frames but no sections nor fdn.....	$3.40	$2.50	$11.45
10-fr. Hive, ditto,.....	3.60	2.70	12.45
8-fr. Hive with sections, inch starters thruout	3.85	2.85	12.95
10-fr. Hive, ditto,.....	4.10	3.10	14.20
8-fr. Hive, with sections, full sheets fdn.	5.15	3.65	17.05
10-fr. Hive, ditto	5.70	4.15	19.55

DOV'D HIVE, 1½-STORY FOR EXTRACTED HONEY

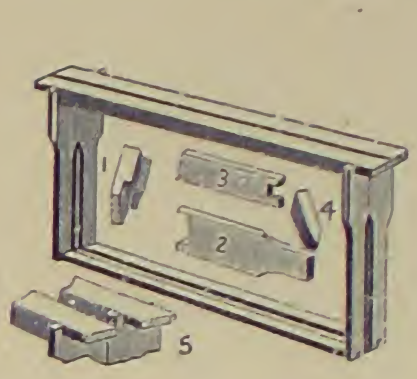
While this hive is made in either eight-frame or ten-frame size, we recommend the ten-frame. It is furnished without foundation, with inch foundation starters or full sheets of foundation, according to the way you order. It consists of a bottom-board, a cover, a body or brood-chamber with Hoffman frames, and a 5⅝-inch super with 5⅜-inch extracting-frames. When two supers are included with each hive it is a two-story hive.

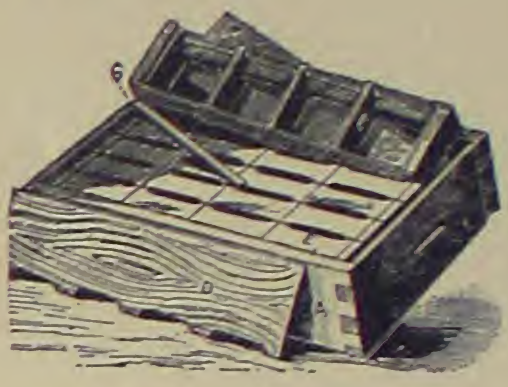


Price List of 1½-story Hive for Extracted Honey, in Shallow Frames.

	1 NP	1 KD	5 KD
8-fr. Hive with frames thruout, no fdn.	$3.35	$2.45	$11.35
10-fr. Hive, ditto,	3.55	2.65	12.35
8-fr. Hive with foundation starters thruout	3.55	2.70	11.90
10-fr. Hive, ditto,	3.80	2.95	13.15
8-fr. Hive with full sheets foundation	5.05	3.50	16.30
10-fr. Hive, ditto,	5.60	4.00	18.80

BROOD FRAMES





Nails included with all frames in flat.

	10	100
Hoffman frames in flat	.40	$3.50
Metal-spaced frames, flat	.45	4.20
Danz brood frames, flat	.35	3.20
Shallow extracting frames, flat	.30	2.70

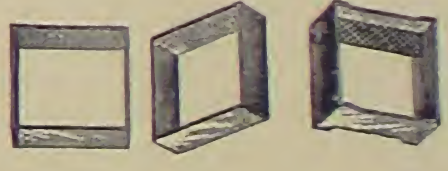
SLOTTED-SECTION SUPER

Comb-honey super with sections 4¼x4¼x1⅞ in flat, 10-frame

1 in. foundation starters	$1.00
Five, same as above in flat	4.50

For other styles, see complete catalog.

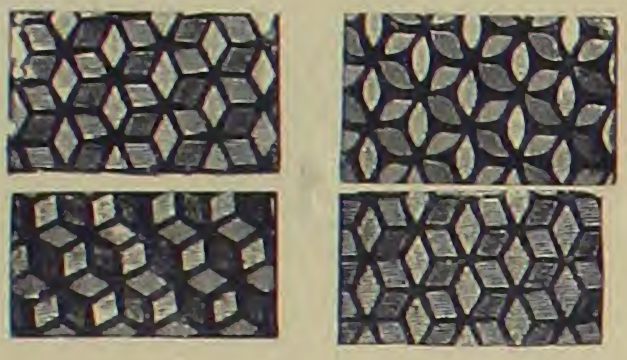
ONE-PIECE V-GROOVE SECTIONS



Be sure to specify correct size.

	A grade	B grade
Per 100	$0.85	$0.75
Per 250	1.75	1.60
Per 500	3.00	2.75

WEED NEW PROCESS FOUNDATION



Prices of Comb Foundation on Application.

BEE VEILS

Globe veil	$1.10
No. 1 veil, all silk	1.00
No. 2 veil, silk face	.70
No. 3 veil, cotton tulle	.60
No. 4 veil, mosquito netting	.30

ROOT SMOKERS

Jumbo (tin) 4-inch barrel $1.25
Standard (tin) 3¼-inch barrel ..... .85
Junior (tin) 2½-inch barrel ..... .55

Hive-tool

Improved Bingham knife

NICKELED STEEL HIVE TOOL

Regular length, 7 inches 40c
Extra long, 10 inches 50c

DAISY FOUNDATION FASTENER

Without lamp $1.00
With lamp 1.25

IMPROVED BINGHAM HONEY-KNIFE

With 8-inch blade 70c
With 10-inch blade 80c

Write at once for our new catalog. Mailed free. Every amateur should have a copy.